DDF Annual Report

Title of Investigation:

Science Information Testbed for the Blind

Principal Investigator:

Dr. Kenneth A. Silberman (Code 933 on detail to Code 503)

Other In-house Members of the Team:

Dr. Horace G. Mitchell (Code 930), Dr. Susan M. Hoban (Code 900.1), and Dr. James R. Thieman (Code 633)

External Collaborators:

Dr. Robert O. Shelton (Johnson Space Center) and
Dr. Betsy Zaborowski (National Federation of the Blind)

Initiation Year:

FY 2004

Aggregate Amount of Funding Authorized in FY 2003 and Earlier Years:

$0

FY 2004 Authorized Funding:

$30,000

Actual or Expected Expenditure of FY 2004 Funding: In-house:

$30,000

Status of Investigation at End of FY 2004:

Completed in FY 2004

Expected Completion Date:

December, 2004

Purpose of Investigation:

This Director's Discretionary Fund (DDF) project aims to increase awareness, remove obstacles, and encourage blind youth to pursue careers in science, technology, engineering, and math. Currently, the space and Earth science content available at the Goddard Space Flight Center (GSFC) is not accessible to blind students. During this investigation, we made certain technical materials accessible and held two special educational summer camps, proving that many of our technologies can be converted into tools to help teachers and parents stimulate an interest in science and math among blind students.

FY 2004 Accomplishments:

The investigation led to the development of curricula used at two summer camps—a rocketry camp for blind high school youth, and a life sciences camp for middle school students. The rocketry camp was held August 15-21, 2004 at Wallops Flight Facility (WFF) and the life sciences camp was held on July 24 at Goddard. Twelve students attended each event.

The rocketry camp featured hands-on exercises. Instructors presented workshops on the history of rocketry, basic rocket physics, and electronics. The 12 students were grouped into three teams: Trajectory Analysis, Launch Pad Operations, and Sensor Facilitation. The Trajectory Analysis team used a graphing calculator, with audible output to determine the trajectory. The Launch Pad Operations team was responsible for all physical aspects of positioning and launching the rocket. The Sensor Facilitation team installed a thermistor, photo resistor, accelerometer, and transducer. The thermistor was used to test the temperature change around the rocket. The photo resistor was used to determine the attitude of the rocket with respect to the Sun. The accelerometer measured the acceleration of the rocket. Lastly, the transducer tested atmospheric pressure.

Under the authority, direction, and control of Phil Eberspeaker, chief of the WWF Sounding Rocket Program Office, the students prepared the payload, loaded the rocket on the launch rail, conducted other pad operations, performed payload and rocket checks, and launched the rocket. Through audible signals the students were able to determine the readiness of their experiments and the rocket. Their rocket reached an altitude of 4,902 feet.

The week ended with a visit to Goddard where the 12 students participated in a mock press conference and tour of Goddard facilities.

On July 24, 2004, 12 middle school students spent the day examining soil, plants, and birds at GSFC. They learned how to obtain a soil sample and detect the characteristics of soil by touch. The students also discovered how to identify certain elements of the soil by smell. In addition, they learned how to test water for certain components, which gives scientists knowledge about the planet.

To carry out the investigation, we worked with the GSFC Learning Center staff and SkillSoft.com, the vendor of Goddard's Web-based training, to test whether the Learning Center's course offerings were 508 compliant and accessible to blind people. Now they are. We also developed raised-lined circuit diagrams created on corrugated plastic signboard with fabric paint. (This will enable blind students and engineers to create circuit diagrams without having to buy expensive raised-line drawing equipment, including Braille graphics printers and raised-line drawing kits. This will be particularly useful for blind students who live in poor school districts.)

The investigation played an integral part in the NASA exhibits at the National Federation of the Blind (NFB) convention in July 2004 and at the opening of the NFB Jernigan Institute in January 2004.

Planned Future Work:

No future work on this particular project is planned.

Summary:

This was the first time that blind students participated in a WFF rocketry camp and in a NASA soil science camp. In addition, inexpensive techniques were developed for manufacturing raised-

line circuit diagrams. Also, because of this investigation, blind engineers and scientists now have a model workstation on which to do their work.

The main criterion for success was to see if blindness technology and mainstream aerospace and scientific technology could be integrated in a manner that would allow the blind students to independently carry out the missions of the two science camps. This project showed that blind youth could develop into engineers and scientists. It also demonstrated that blind engineers and scientists can perform in the high-tech environment. The two science camps, the new raised-line drawing techniques, and the workstation demonstrated that blind engineers, scientists, and students could do NASA's cutting-edge work.

Combining adaptive technology for the blind with NASA's state-of-the-art sounding rocket and science technology had never been done before, and represented a technical risk. The two technologies were successfully integrated in a manner that allowed the blind students to independently carry out the missions of the two science camps.